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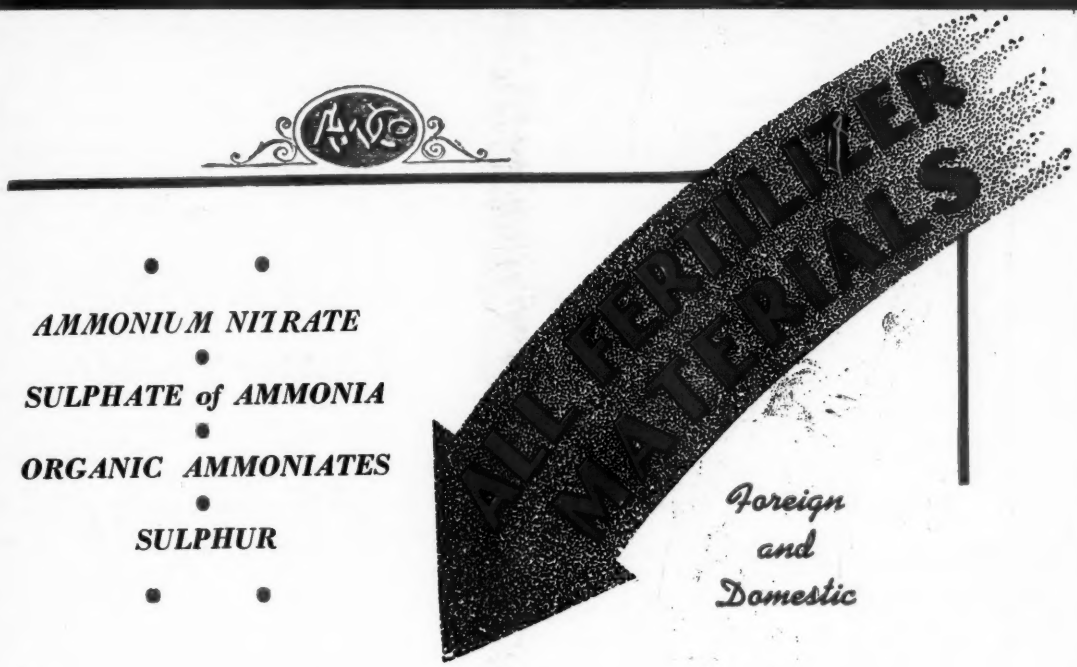

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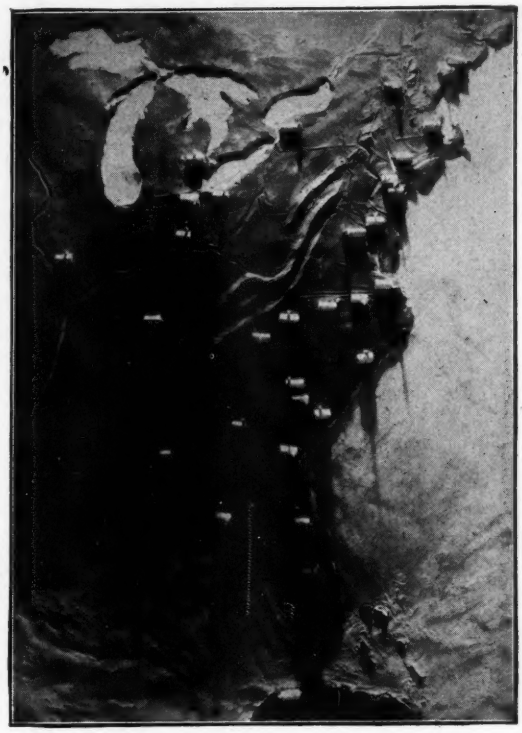

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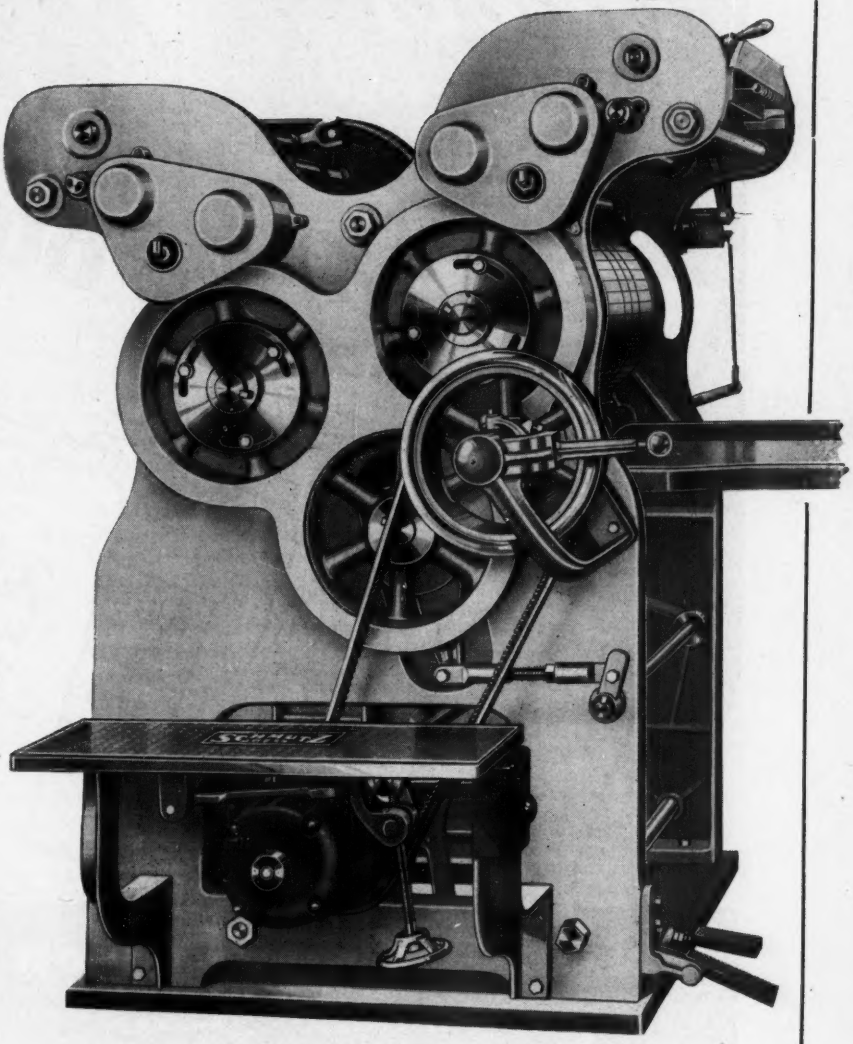

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The American FERTILIZER

Vol. 105 OCTOBER 5, 1946 No. 7

Magnesium in Agriculture

Abstracts of papers presented at a Symposium of the Division of Fertilizer Chemistry, American Chemical Society, held at Chicago, Ill., September 10, 1946

Some Factors Influencing the Availability of Magnesium in the Soil and the Magnesium Content of Certain Crop Plants

H. P. Cooper, The Clemson Agricultural College, S. C. Experiment Station, Clemson, S. C.

Magnesium is widely distributed in numerous minerals, usually in association with such metals as iron, cobalt, nickel, and zinc. Soils having a low content of iron are likely to be relatively low in magnesium. The mature leached gray sandy loam soil series relatively low in colloidal content in regions with relatively high rainfall are most likely to be deficient in magnesium for optimum crop production. Magnesium is a constituent in chlorophyll and the free energy decrease values in the formation of nutrient compounds indicate that it is very probably the strongest cation that could readily enter into direct photosynthetic reaction with some of the stronger anions such as carbonates and phosphates.

Since nutrients tend to be selectively absorbed by many plants in the order of the relative strength of their ions, it is interesting to consider some of the common measures of ionic strength. By the use of the standard electrode potentials and ionization potentials of ions in combination with solubility values and the available energy in the sunlight, it is possible to predict the relative availability of nutrient ions in the soil, also the intensity of absorption, occurrence in plants, and the light energy required for their assimilation. There seems to be a correlation between the relative strength of nutrient ions used by plants and the light requirements of plants and the quality or food value of the organic compounds synthesized. Plants requiring strong ions for optimum growth require light of high energy value and synthesize organic compounds which on oxidation or digestion may supply the approximate quanta of energy utilized in the material.

The Relation of Plant Development in Seed Plants to the Need of Magnesium

W. S. Eisenmenger, Massachusetts State College, Amherst, Mass.

The need for magnesium is not restricted to any plant species, but lands having limited amounts of the element demonstrate varying pathological symptoms depending upon the nature of the plant.

Upon a plot deficient in magnesium, the author has never found a plant in the lower order which did not react favorably to the application of magnesium and the symptoms of chlorosis or discoloration prevailed. Among these plants are the Ranales, the Malvales, the Geraniales, and the Papaverales. Among the next higher order, the reaction is not so pronounced and when we come to the extreme higher orders, it is rare that any of the natural orders show symptoms of the need of magnesium. Among these families are the Compositae, the Graminales, and the Lamiales.

There are conflicting circumstances which give rise to exceptions. Such plants which have been subjected to intensive breeding

may or may not show the need. Corn is an example. Some plants never chlorose but do not grow where magnesium is deficient. An example of this kind is Portulaca oleraceae, commonly known as "pussley" or "common purslane." Some of the rosaceae behave similarly.

The Magnesium Content of Fertilizers 1938 to 1945

A. L. Mehring, Bureau of Plant Industry, Soils, and Agricultural Engineering, Bellsville, Md.

Seventy per cent of the magnesium added to crops in recent years has been in the form of liming materials. Ten years ago 80 per cent was in the form of animal manures. This rapid change has been due to the tremendous increase in the use of ground limestone and to an increase in the average magnesium content of the limestone used. Relatively less dolomite is now used to make mixed fertilizers than in 1937 although the total tonnage is larger. The percentage of water-soluble magnesium in mixed fertilizers has increased. Nearly all of the common fertilizer materials contain small proportions of magnesium. Thus mixed fertilizers always contain traces even though none is intentionally added. The magnesia content of sixty-two representative samples of mixed fertilizers manufactured without any of the recognized magnesium carriers, such as dolomite, Cal-Nitro, sulphate of potash-magnesia, etc., is 0.28 per cent.

Magnesium Nutrition of Apple Orchards

Boynton and J. C. Cain, Cornell University, Ithaca, N. Y.

Since 1939 when magnesium deficiency of apple trees was recognized by Wallace in England, this trouble has been found in New Zealand, eastern Canada, and eastern United States. It occurs in orchards on acid soils that are usually low in exchange capacity as well as exchangeable bases. The use, over a period of years, of wettable sulphur spray materials and acid-forming nitrogenous fertilizers has been common in many of the American orchards in which some trees are showing magnesium deficiency symptoms. Heavy potassium fertilization has tended to increase the prevalence of the symptoms in orchards predisposed to show them. The difficulty is apt to be more apparent in years of rather high rainfall than in years when rainfall is below normal. To some extent vegetative trees high in nitrogen may be somewhat less susceptible than trees low in nitrogen.

Recovery has been seldom marked in the first growing season following soil amendments of epsom salts, kieserite, salt-water magnesia, or dolomitic limestone, but after several years of generous applications complete recovery has been attained. On the other hand, early summer sprays of epsom salts solution have seemed to be effective in preventing the development of symptoms in the year of application.

The Magnesium-supplying Powers of 20 New Jersey Soils

Arthur L. Prince, Miryam Z. Kass, and Firman E. Bear, New Jersey Agricultural Experiment Station, New Brunswick, N. J.

A-horizon samples of 20 soils were placed in 2-gallon pots and optimum amounts of water and of the several nutrient elements were supplied, except for Mg, which was added at rates of 0, 40, and 80 pounds of MgO per 2,000,000 pounds of soil. Alfalfa was used as an extracting agent, 8 successive crops being harvested. Analyses were made of the soil before and after the experiment and of the tops and roots of the plants. It was concluded that: (1) The most important factor influencing the uptake of Mg is the supply of available K. (2) It is doubtful whether 80 pounds of MgO per acre are adequate where high-K fertilizers are applied to low-Mg soils. (3) If Mg constitutes less than 6 per cent of the exchange cations, crop response to Mg application is likely. (4) The exchange complex of the "ideal" soil should contain around 65 per cent Ca, 20 per cent H, 10 per cent Mg, and 5 per cent K.

Some Observations from 32-year Lysimeter Studies of Magnesic and Dolomitic Materials

W. H. MacIntire and W. M. Shaw, University of Tennessee, Agricultural Experiment Station, Knoxville, 16, Tenn.

Incorporations were light and heavy oxides and basic and normal carbonates and sulphate of magnesium, and magnesite; dolomitic incorporations were as separates, as calcines, and as simulative oxide mixtures; basis of 1/8 to 100 tons of CaO-equivalence per acre; full depth, with and without subsoil, and in either upper or lower zones, and as single, 1/4 per annum, and 1/8 per annum inputs.

Basic magnesic additions repressed outgo of Ca and K from zone of incorporation, but effected Ca release in underlying zone. In-

(Continued from page 28)

Fertilizers in Wartime Germany

By K. D. JACOB

Bureau of Plant Industry, Soils, and Agricultural Engineering,
Agricultural Research Administration,
U. S. Department of Agriculture,
Beltsville, Maryland

(Continued from the issue of September 21, 1946)

Phosphate in Germany

Unlike nitrogen and potash, sources of phosphate in Germany have always been insufficient to supply the country's requirement of this commodity. Consequently, it has been necessary to import a considerable portion of the phosphate, both raw materials and finished products, needed for fertilizer. Also, it has been necessary to import practically all of the raw phosphate required for the manufacture of elemental phosphorus and phosphorus-containing chemicals.

The German resources of phosphate consist almost solely of phosphorus-bearing iron ores from which the phosphorus is recovered in the form of basic slag (Thomas meal or Thomas phosphate), a byproduct of the manufacture of steel, which for many years has been Germany's principal source, recently almost the only source, of phosphate for agricultural use. However, the German production of basic slag is derived not only from domestic iron ores but also from imported ores. Moreover, considerable quantities of imported phosphate rock and apatite are normally used in the manufacture of the slag. Figures on the production of basic slag in Germany do not, therefore, reflect accurately the utilization of domestic phosphate resources for this purpose.

It is reported that during the war some 50 to 100 metric tons of low-grade phosphate rock were mined monthly from deposits along the Lahn River between Nassau and Limburg. This material, which was used in iron blast furnaces, is understood to have been the only wartime production of mineral phosphate[7] in Germany.

The effect of the war on importation of mineral phosphate into Germany is shown by the data of Table VI. As a result of the stoppage of shipments from North Africa and the United States, the import of mineral phosphate in 1940, consisting solely of apatite from the Soviet Union, dropped to 186,638 metric tons or only 21 per cent of the receipts in 1939. With the fall of France and the emergence of Italy as a Nazi ally, Germany gained access to the Algerian and Tunisian deposits by way of the Mediterranean and obtained sizeable quantities of phosphate rock therefrom in 1941 and 1942. On the other hand, Germany's attack on the Soviet Union

[7]The term "mineral phosphate," as used in this paper, refers to raw mineral products, such as apatite, phosphate rock or phosphorite, etc., which are valued primarily for their content of phosphorus. It does not include, for example, the phosphate in iron ores.

TABLE VI

SOURCES OF IMPORTS OF MINERAL PHOSPHATE INTO GERMANY, CALENDAR YEARS 1937 TO 1944

(Metric tons)

Source	1937	1938	1939	1940	1941	1942	1943	1944
Curacao	18,190	11,246	24,139	....	....	....	....	....
Florida	298,558	565,215	423,240	....	....	....	....	....
Algeria	158,035	129,423	96,834	....	242,232[1]	258,725[1]	62,558[2]	17,165[2]
Tunisia	142,607	78,936	116,163	....	([3])	([3])	([3])	([3])
Morocco	170,868	143,882	178,590	....	....	....	27,312[4]	5,909[4]
Egypt	6,030	....	5,044	....	....	....	....	....
Soviet Union	83,000	136,013	36,173	186,638	32,000	....	....	....
Belgium	....	....	....	....	....	....	1,510	15,990
Estonia	....	....	....	....	....	....	22,950	31,775
Total	877,288	1,064,715	880,183	186,638	274,232	258,725	114,330	70,839

[1]Algeria and Tunisia.
[2]Algeria and Tunisia; from stocks in France.
[3]Included with Algeria.
[4]From stocks in France.

eliminated that country as a source of supply. By 1943 the conditions in the Mediterranean had become so unfavorable that Germany resorted to the seizure of phosphate rock from stocks of the North African material in France. At the same time, limited quantities of low-grade phosphate were obtained from the deposits in Belgium and Estonia. The 70,839 tons of mineral phosphate imported in 1944 amounted to only 8 per cent of the quantity received in 1939.

The quantities of mineral phosphate imported into Germany for various uses during the calendar years 1937 to 1944 are shown in Table VII. The material used by the I. G. Farbenindustrie was consumed mostly at Piesteritz for manufacture of elemental phosphorus by the electric furnace process; it consisted almost entirely of phosphate rock and in the pre-war years it was obtained chiefly from Florida. Prior to the war the elemental phosphorus was converted principally into fertilizers of the Nitrophoska type and into phosphate chemicals. Subsequently, much of the phosphorus was undoubtedly used for military purposes. All of the Estonian phosphate imported in 1943 and 1944 was processed in the Piesteritz furnaces. Imports of mineral phosphate from the Soviet Union were in the forms of apatite concentrate and crude apatite ore, both from the Kola Peninsula. The concentrate was used chiefly for the manufacture of superphosphate[8] while the crude apatite was used in steel and blast furnaces and for manufacture of Rhenania phosphate.[9] The mineral phosphate imported from Belgium, principally if not entirely phosphatic chalk from the Mons and Liége areas, was ground and used for direct application to the soil. It appears that prior to 1940 at least 75 per cent of the mineral phosphate imported into Germany was consumed as fertilizer. Subsequently, however, the proportion decreased greatly and probably did not exceed 20 per cent in 1944.

Table VIII shows the production of phosphate fertilizers in Germany (Old Reich) during the period 1936–37 to 1944–45, as distributed among the various types of materials. In the first year of the war the total production of fertilizer P_2O_5 decreased to 66 per cent of that in 1938–39, the last pre-war year. In the next four years the production fluctuated rather irregularly and averaged 57 per cent of the 1938–39 output. On the same basis, however, the output in the final year of the war was only 31 per cent. As basic slag is obtained as a byproduct of the manufacture of steel it is not surprising that the output of P_2O_5 in this form was maintained at a high level until the last year of the war. On the other hand, the production of superphosphate, Rhenania phosphate, etc., all of which were derived solely from imported mineral phosphate, was drastically curtailed in the first year of the war and suffered further decrease

[8]The term "superphosphate," as used in this paper, refers only to ordinary superphosphate usually containing 16 to 18 per cent of water-soluble P_2O_5. There was no manufacture of double superphosphate in Germany during the war or for a good many years prior thereto.

[9]Rhenania phosphate has been manufactured in Germany for about 30 years by heating phosphate rock with soda ash and silica in rotary kilns.

TABLE VII
IMPORT OF MINERAL PHOSPHATE INTO GERMANY FOR VARIOUS USES, CALENDAR YEARS 1937 TO 1944
(Metric tons)

Use	1937	1938	1939	1940	1941	1942	1943	1944
Superphosphate...	379,088[1]	530,872[1]	459,759[1]	117,500[2]	242,202[2]	224,600[2]	114,330[3]	70,839[3]
Steel and blast furnaces[4].....	87,800	57,797	74,276	69,138	32,030	34,125	....	
Rhenania phosphate.....	106,400	83,984	....	....	....	....	....	....
Other fertilizers[5]...	....	3,150	986	....	....	....	....	....
I. G. Farbenindustrie[6].....	280,300	355,043	282,464	....	....	....	....	....
Other phosphate chemicals.....	23,700	33,869	26,698	....	....	....	....	....
Total.....	877,288	1,064,715	880,183	186,638	274,232	258,725	114,330	70,839

[1]Includes small quantities used by superphosphate manufacturers in production of phosphate chemicals.
[2]Import for all purposes except use in steel and blast furnaces.
[3]Import for all purposes.
[4]Production of basic slag.
[5]Additional large quantities of mineral phosphate were used in most years by the I. G. Farbenindustrie for manufacture of fertilizers such as Stickstoffkalkphosphate and Nitrophoska.
[6]Prior to the war, use of mineral phosphate by the I. G. Farbenindustrie was mostly for manufacture of fertilizers such as Stickstoffkalkphosphat and Nitrophoska, principally the latter.

in subsequent years. In 1943–44, 99 per cent of the production of fertilizer P_2O_5 was in the form of basic slag, compared to 80 per cent in 1938–39. Normally, about 5 per cent of the P_2O_5 in German slag is derived from mineral phosphate and the remainder from the iron ore.

TABLE VIII

PRODUCTION OF PHOSPHATE FERTILIZERS IN GERMANY, 1936–37 TO 1944–45

(Metric tons of P_2O_5)

Year[1]	Basic slag	Superphosphate	Rhenania phosphate	Other phosphates[2]	Total
1936–37	372,800	119,786	24,400[3]	60,300[3]	577,286
1937–38	395,840	133,549	22,386	71,740	623,515
1938–39	423,040	158,368	28,206	80,518	690,132
1939–40	364,320	61,298	8,927	21,504	456,049
1940–41	329,920	9,799	4,664	14,719	359,102
1941–42	356,640	7,428	16,212	18,286	398,566
1942–43	428,160	7,223	8,459	10,300	454,142
1943–44	371,520	2,185	....	148	373,853
1944–45	208,000	2,511	....	....	210,511

[1]May 1st to April 30th.
[2]Kalkammonphosphat, Nitrophoska, and Stickstoffkalkphosphat.
[3]Estimated.

Prior to 1938–39 the import of phosphate fertilizers (P_2O_5 basis) into Germany (Old Reich) was greatly in excess of the export, but in subsequent years the foreign trade in such products was, in general, quite evenly balanced (Table IX). Throughout the war and for at least a number of years previously, the import of fertilizer P_2O_5 was mostly, if not entirely, in the form of basic slag. Beginning with 1938–39 basic slag also accounted for all or nearly all of the fertilizer P_2O_5 exported from Germany. In previous years, however, export of P_2O_5 in other forms outweighed that of slag.

Data on the consumption of fertilizer P_2O_5 in Germany (Old Reich) for the years 1936–37 to 1944–45 are shown in Table X. Compared to 1938–39 the consumption was 60 per cent during the first year of the war and 46 per cent in the second year. There were further decreases in subsequent years until in 1944–45 the consumption was only 19 per cent of that in 1938–39. Among the various kinds of phosphate fertilizers the distribution of the consumption followed, in general, patterns similar to those of the production (Table VIII). About one-third of the superphosphate consumed annually in pre-war Germany was used in the form of mixed fertilizers. In 1938–39 the consumption of phosphate in Germany averaged 26.7 kilograms of P_2O_5 per hectare of arable land.

TABLE X

CONSUMPTION OF PHOSPHATE FERTILIZERS IN GERMANY, 1936–37 TO 1944–45

(Metric tons of P_2O_5)

Year[1]	Basic slag	Superphosphate[2]	Rhenania phosphate	Other phosphates[3]	Total
1936–37	428,640	128,728	([4])	44,700[5]	631,000
1937–38	439,382	145,943	22,386	74,307	682,018
1938–39	475,483	176,939	28,206	81,954	762,582
1939–40	342,049	70,311	8,927	32,289	453,576
1940–41	328,981	11,069	4,664	16,231	360,945
1941–42	279,895	6,568	15,038	17,791	319,292
1942–43	301,370	7,857	9,458	10,929	329,614
1943–44	292,401	781	25	351	293,558
1944–45	144,040	1,206	19	.....	145,265

[1]May 1, to April 30th.
[2]Including consumption as mixed fertilizer.
[3]Kalkammonphosphat, Nitrophoska, Stickstoffkalkphosphat, bone meal, etc.
[4]Included in total.
[5]An additional quantity is included in the total.

(Continued on page 26)

TABLE IX

GERMANY'S EXPORT AND IMPORT OF PHOSPHATE FERTILIZERS, 1936–37 TO 1944–45

(Metric tons of P_2O_5)

	Basic slag		Superphosphate[2]		Other phosphate[3]		Total	
Year[1]	Export	Import	Export	Import	Export		Export	Import
1936–37	1,440	87,680	4,727	9,737	9,588		15,755	97,417
1937–38	7,200	108,800	4,917	11,781	11,718		23,835	120,581
1938–39	69,760	69,760	1,941	9,809	8,965		80,633	79,569
1939–40	30,120	33,280	81	1,016	3,749		33,950	34,296
1940–41	64,166	74,240	10	874	631		64,807	75,114
1941–42	80,882	91,840	....	....	75		80,957	91,840
1942–43	101,416	104,480	56	....	....		101,472	104,480
1943–44	64,844	108,320	124	....	....		64,968	108,320
1944–45	417	20,320	....	....	....		417	20,320

[1]May 1st to April 30th.
[2]Includes mixed fertilizers.
[3]Nitrophoska and Stickstoffkalkphosphat, of which there were no imports.

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Vol. 105 OCTOBER 5, 1946 No. 7

Principal Articles in This Issue

Nation's Farm Plant Value Tops 100 Billions

American agriculture was worth 101.5 billion dollars at the beginning of 1946, in bookkeeping terms, representing gains of nearly 12 per cent from a year earlier and practically 90 per cent since January 1, 1940.

The dollar valuation of agriculture is shown in "The Balance Sheet of Agriculture, 1946," a study by the Bureau of Agricultural Economics, an abstract of which is published in the current issue of the Federal Reserve *Bulletin*.

Of the total value of the Nation's agricultural plant on January 1st, the study shows, farm real estate accounted for 56.6 billion dollars, compared with 50.3 billions on January 1, 1945. Other physical assets made up 24.9 billion dollars, compared with 24.4 billions a year earlier. Financial assets of farm operators totaled more than 20 billion dollars, compared with 16.2 billions in 1945.

Equities of farmers and other owners of the farm business accounted for 93.2 billion dollars of the total dollar worth of agriculture, compared with 81.9 billions on January 1, 1945. Creditors' claims amounted to 8.3 billion dollars, a decrease of 700 million dollars from a year earlier.

The increase in agriculture's total worth since January 1, 1945, the study points out, is attributable mainly to price increases for agriculture's physical assets and to accumulations of financial assets resulting from a large volume of sales, at recent prices. Comparatively little of the increase came from physical improvements in the Nation's farm plant.

Financial assets of farmers on January 1st this year are estimated to include practically 14 billion dollars in deposits and currency, compared with 11.3 billions a year earlier; about 5 billion dollars in War Bonds, compared with 4 billions last year; and 1 billion dollars of investment in cooperatives, only slightly more than the year before.

The large increase in holdings of cash and Government bonds during the war years, the BAE study shows, probably reflects among other things some deterioration of the farm plant. Failure to maintain farms and equipment at pre-war level probably has contributed about $800 million dollars to the cash holdings of farmers in the period 1942–45 which will need to be reinvested in peacetime.

The value of total physical assets of farms

gained 9 per cent during 1945. Farm real estate values increased 13 per cent during the year; livestock on farms, 9 per cent; household equipment, 2 per cent; and machinery and motor vehicles, 1 per cent. The value of crops on hand decreased 6 per cent.

Farm mortgage debts again declined during 1945, though to a less extent than in other recent years. Farm mortgage debt at the beginning of 1946 stood at 5 billion dollars, down 4 per cent from a year earlier and 23 per cent under the level of January 1, 1940. Not only did farm mortgage debt decrease less than in previous war years, but it actually increased in 20 States.

Farmers' non-real estate debts to principal lending institutions, not including loans guaranteed by the Commodity Credit Corporation, increased 3 per cent during 1945. Nonrecourse loans held or guaranteed by CCC decreased and unguaranteed loans increased somewhat. Debts to miscellaneous lenders such as merchants, finance companies and dealers is believed to have increased somewhat during 1945.

Caldwell Resigns as Secretary of Plant Food Council

The resignation of Harry B. Caldwell as Secretary-Treasurer of the American Plant Food Council, Inc., to accept a position as Executive Secretary of the newly-formed North Carolina Good Health Assoliation, with offices in Durham, N. C., was announced on October 2nd by Clifton A. Woodrum, president of the Council.

Mr. Caldwell, a well-known North Carolina farm leader, joined the Council's staff in September, 1945, after serving as master of the North Carolina State Grange for four two-year terms.

"We are reluctant to lose Mr. Caldwell's services, but we share with him the great concern for the health of the Nation and have some consolation in the fact that both the plant food industry and the North Carolina Good Health Association are united in the belief that the prosperity of our Nation depends upon the health and vigor of its citizens," Mr. Woodrum said.

A successor to Mr. Caldwell has not been named.

"My decision to resign from the staff of the American Plant Food Council was most difficult, inasmuch as I assisted in the formation of its policies and subscribe wholeheartedly to its objectives," Mr. Caldwell said.

"I am grateful to the officers and members of the American Plant Food Council in accepting my resignation and I shall continue to be interested in their efforts and have perfect confidence in their continued success."

Woodrum Reports Increased Nitrogen Production

Deliveries of nitrogen supplies for the 12-month period beginning July 1, 1945, and ending June 30, 1946, totaled 798,700 tons, or 26,110 tons above the production goal established, Clifton A. Woodrum, president of the American Plant Food Council, has announced, based on reports provided by the Civilian Production Administration. Supplies of nitrogen available to the United States and possessions for the fertilizer year ending June 30th totaled 725,228 tons.

"The nitrogen industry has just right to be proud of its achievement in exceeding the 1945–46 production goal by more than 26,000 tons, in the face of many difficulties," Mr. Woodrum said.

	Nitrogen Supplies (tons of Nitrogen)	
	1945–46	Deliveries
U. S. Production	Program	(12 mos.)
Sulphate of Ammonia	170,150	149,200
Solutions	170,000	185,000
Nitrogen Compounds	72,530	63,000
Ammonium Nitrate	120,900	160,500
Organic	30,000	30,000
	563,580	587,700
Imports from Chile	104,000	98,800
Imports from Canada		
Sulphate of Ammonia	24,600	25,800
Cyanamid	29,400	30,000
Ammo Phos 11–48	3,850	4,000
Ammo Phos 16–20	6,960	8,200
Ammonium Nitrate	40,200	44,200
Total Canadian Imports	105,010	112,200
Total U. S. Supply	772,590	798,700
Exports Approved by Combined Food Board	73,472	73,472
Available for U. S. Agriculture and Possessions	699,118	725,228

Obituary

Charles N. McNulty

Charles N. McNulty died on September 6th at the Long Island College Hospital after an illness of several months. Mr. McNulty joined the staff of the Texas Gulf Sulphur Company in 1920 upon his return from France, where he served in the infantry during World War I. Prior to his service in the Army he had been employed in the Traffic Department of the Southern Railway.

California Fertilizer Association To Hold Annual Meeting

Plans have been completed for the Annual Convention of the California Fertilizer Association, to be held at the Beverly Hills Hotel, Beverly Hills, Calif., on October 14th, 15th and 16th. The opening day will be given over to a golf tournament at the Brentwood Country Club, and the business sessions will be held on October 15th at 9:30 A. M. and October 16th at 9:30 A. M. and 2 P. M.

Speakers will include M. H. Lockwood, president of the National Fertilizer Association; C. T. Prindeville, of Swift & Company; Wilson Meyer, Dr. W. W. Robbins. Other speakers will discuss the raw materials and labor situations. The committee has provided an enjoyable entertainment program for the ladies.

Haines Heads New Patent Department at International

Appointment of Ernest V. Haines as head of the newly created patent department of International Minerals & Chemical Corporation has been announced by Louis Ware, president of the company. Mr. Haines will work at the Chicago headquarters of the company under Dr. Paul D. V. Manning, vice-president in charge of the research division, and will handle all details relating to patent developments for the corporation.

Mr. Haines came to International following his discharge from the army as captain in the corps of engineers, where he was identified with the development of a patent structure for the atomic bomb project in the Office of Scientific Research and Development. Previously, he spent eight years in the U. S. Patent Office as an examiner for patent applications relating to organic chemistry. He also served as a patent attorney for the Standard Oil Development Company of New York for six years.

Mr. Haines, who is 38 years old, graduated from the University of Maryland in 1930 with a bachelor's degree in chemistry, and later took graduate work in chemistry at George Washington University in Washington, D. C. He then entered the law school of Georgetown University of Washington, D. C., and received his law degree in 1935. He is a member of the Patent Office bar, the bar of the Court of Customs and Patent Appeals and the bar of the District and Certain Courts of Washington, D. C.

St. Regis Appointments

James J. Weldon has been transferred from the New York office of the St. Regis Paper Company to the Southeastern division sales district, which has its headquarters in Baltimore.

Mr. Weldon will concentrate on multiwall paper bag sales in the Carolinas and in Georgia and will make his headquarters in Atlanta.

James W. Taylor, one of the field promotional men who have been engaged in making a field survey of bakers' reactions to the advantages of the multiwall paper bag as a container for bakery flour, has been transferred from the New York office to the Southeastern Sales district.

William T. Volkhardt has joined the sales promotion department at the Company's New York office, in charge of market research.

Mr. Volkhardt was affiliated with the Bethlehem Steel Corporation for five years as an industrial engineer and prior to that he was a market research analyst for the Scott Paper Company.

FERTILIZER MATERIALS MARKET

NEW YORK

Materials Market Quiet. Transportation Situation Improves. Fertilizer Imports Decline in 1945-46, Exports Increase. Packing-House By-Products at Lowest Production Levels. Greater Phosphate Rock Production Expected.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, September 30, 1946

Fertilizer raw materials markets have been comparatively quiet during the past two weeks' period, and inquiry for ammonium sulphate, potash and superphosphate has come mainly from newly established manufacturers. The anticipated transportation shortage has not interfered as yet with the movement of fertilizer materials and shipments are being made as scheduled against new contracts.

The Department of Commerce reports that importation of fertilizer materials during the 1945–46 season was 24 per cent less than imports for the previous year. This decline is attributed to the smaller imports of Chilean nitrate of soda, North African phosphate rock and organic materials from South America.

The Department of Commerce report on exports shows that shipments during the 1945–46 fertilizer year were 71 per cent greater than for the preceding year. Increased exports of nitrogenates, phosphate rock and superphosphates were mainly responsible for this large increase.

Sulphate of Ammonia

Active demand continues from the smaller fertilizer mixers but limited supply has prevented the making of further contracts at this time. By-product production is holding up well, and supplies moving promptly against current contracts.

Nitrate of Soda

Stocks of both domestic and foreign material are adequate to take care of seasonal demand. Shipments are on the way from Chile, and these imports are expected to increase considerably around the first of the year.

Organic Materials

The production of packing house by-products has reached a record low level, and even the feed trade has been unable to obtain supplies under current conditions. South American producers remain reluctant to sell in this market on account of the lower prevailing prices here. It seems likely that higher ceilings will be established for castor meal in the new future.

Superphosphate

Most acidulators are in a sold-up position, and many fertilizer mixers have been unable to cover their anticipated requirements for this year. Figures recently released by the Department of Commerce show that during the 1945–46 fertilizer year approximately 7½ million tons of normal superphosphate and 280 thousand tons of concentrated superphosphate were produced.

Phosphate Rock

Producers remain under heavy pressure, and production has been maintained at maximum levels. It has been reported that some mines have received machinery and parts for expansion and repairs, and a gradual improvement in the supply situation is expected. There is still no immediate prospect of obtaining foreign supplies for the fertilizer industry.

Potash

Many new mixing plants have not received government allocations yet, but some tonnage has been set aside to take care of these manufacturers. Demand for shipment against current contracts is heavy for this time of year, and some delays are reported due to difficulty in obtaining boxcars.

Fertilizer Imports Monopolized in Peru

The Peruvian guano monopoly, which heretofore has confined its operations to the production and distribution of that material, is now authorized to import and sell all kinds of fertilizers. All such imports are exempt from duty and, according to information from the United States Embassy at Lima, will be sold at cost.

CHARLESTON

Greatest Production of Mixed Fertilizer Expected for Coming Season. Material Supplies Still Short. Organics Production Sharply Curtailed.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, September 30, 1946

All fertilizer raw materials remain in heavy demand with supplies of none plentifully available. However, in spite of labor, transportation and materials shortage difficulties, the production of mixed fertilizers is ahead of last year and is expected to continue to better the last year's tonnage.

Organics.—Trading in packing-house by-products recently has been extremely light as production reached a new low. OPA ceilings still prevail but few offerings can be obtained. South American sources cannot offer in quantity because of export controls which have been tightened. South American prices are practically double domestic on dry rendered tankage; and other packing-house products are far above U. S. ceilings. Prices of domestic nitrogenous remain at current ceilings, but production is expected to continue sharply curtailed. European organics remain practically unobtainable.

Bone Meals.—Domestic market strong but practically none is offered. South American market on bones and bone meals remains well above domestic ceilings.

Blood.—Ceiling price of $5.53 per unit of ammonia ($6.72 per unit N) plus $7.50 per ton results in strong demand but extremely light offerings. Low kill at packing houses makes market very inactive.

Fish Meal and Fish Scrap.—Feed market continues to take bulk of what fish is being processed—in the form of fish meal. Very little being sold for fertilizer use as fish scrap. South American fish meal offered at $130.00 c.i.f. Atlantic ports.

Nitrate of Soda.—Seasonal decrease in demand now in effect. Industrial demand normal for this period. Stocks being built up by importers for expected heavy demand later.

Sulphate of Ammonia.—Demand is heavy for mixing purposes with supply short of call.

Superphosphate.—Demand strong and in excess of supply. Some dry-mixers will not get all they require for their needs. Producers' stocks remain low as they try to supply the demand.

Phosphate Rock.—Current production is relatively high but is unable to keep up with demand. Production last year reached a new high with over 5¼ million tons produced.

Castor Pomace.—The two producing plants that have been on strike are now producing but not offering any material. Increased price ceilings are being pressed for by the producers.

PHILADELPHIA

Demand for Materials Unusually Heavy. More Nitrate of Soda Expected Shortly. Almost No Offerings of Organics Reported.

Exclusive Correspondence to "The American Fertilizer"

PHILADELPHIA, September 30, 1946

The demand for raw materials is unusually heavy for this time of the year, and it is expected that the mixed fertilizer demand this coming season will reach a new high. Meanwhile transportation difficulties and the acute shortage of organics are very disturbing factors.

Sulphate of Ammonia.—Shipments are moving right along to fertilizer mixers. The demand is very heavy and present production is said to still be considerably below normal.

Nitrate of Soda.—Present movement is mostly into the industrial trade and several vessels are expected to arrive from Chile

early in October. Increased quantities for agricultural use will likely be imported after the first of the year.

Castor Pomace.—This material is again in production and a few shipments moving, but the demand is far greater than can be supplied.

Blood, Tankage, Bone.—Reduced slaughtering is reflected in the almost total absence of offerings even for feeding. Only lower grade organic nitrogenous materials are available to the fertilizer mixer and these are in very limited supply. An advance in the blood and tankage ceilings expected this week did not materialize. There are practically no offerings.

Fish Scrap.—No new business reported, but it is thought activity might be aroused were the ceiling restrictions removed.

Phosphate Rock.—The demand continues far in excess of the capacity to supply.

Superphosphate.—Shipments are moving on contracts, but the supply is not sufficient to satisfy inquiries.

Potash.—Shipments are moving steadily on contracts, with very strong demand, and mixers not receiving as much as they want. Many plants are quite short of this article.

CHICAGO

Light Livestock Receipts Reduces Feed and Fertilizer By-Products. Chrome Stock Ruling Not Changed.

CHICAGO, September 30, 1946

The continuation of light livestock receipts has naturally reduced packers' production of fertilizer and feed materials. In fact the large producers are not making enough to supply their own requirements.

The chrome stock ruling has not been changed and, therefore, no increase in the output of nitrogenous has occurred. The curtailed production of feeding materials and the uncertainty of the future result in slow business.

The ceiling prices of digester tankage, 60 per cent protein, is $81.03; and of meat scraps, 50 per cent protein, is $80.00, bulk basis, f. o. b. producing point.

Calgary Ammonium Nitrate To Continue

The Department of Commerce reports that the production of ammonium nitrate by the Alberta Nitrogen Products, Ltd., of Calgary, Canada, will be continued for at least two years to meet the demand of the fertilizer industry for this product.

How a talc producer reduced his packaging costs

and "licked" dust at the same time

This 9th case history in a series of St. Regis Packaging System success stories tells how Cohutta Talc Co. of Dalton, Georgia, has improved working conditions and lowered packaging costs by using a St. Regis valve bag filling machine and multiwall paper valve bags.

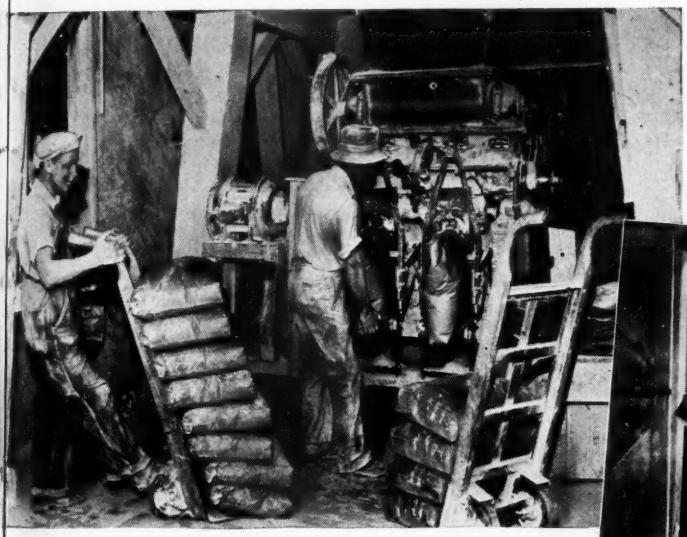
The product, formerly packed in bulky 200-lb. burlap bags, is now packed in easy-to-handle 50-lb. multiwall paper bags.

DUST IS CONQUERED— The St. Regis machine confines the dust during the packing operation and there is no siftage through the bag as in the case of burlap. So the dust problem was immediately eliminated from the packing operation.

BETTER WORKING CONDITIONS WELCOMED— Employees derived great satisfaction from the abatement of the dust nuisance as well as from working with the clean, easy-to-handle 50-lb. paper bags.

LABOR COSTS CUT 70% — A three man crew now packs ten tons an hour. This is *twice* the tonnage that a *five* man crew was able to pack in burlap. Labor cost dropped 70% . . . from 50 cents to 15 cents per ton packed.

TOTAL COST REDUCED— The Cohutta Company reports its per ton cost for burlap bags at $1.80 and for multiwall bags at $1.35 . . . a saving of 45 cents per ton. This, added to the saving in labor costs, results in an overall saving in packaging costs of 80 cents a ton.



(Left) One man operates the St. Regis 107-FC Packer, which simultaneously weighs and fills the 50 lb. multiwall bags.

(Right) Filled bags are easily moved by hand trucks and loaded in freight car.

ST. REGIS SALES CORPORATION

(Sales Subsidiary of St. Regis Paper Company)

NEW YORK 17: 230 Park Ave. **CHICAGO 1: 230 No. Michigan Ave.**
BALTIMORE 2: 2601 O'Sullivan Bldg. **SAN FRANCISCO 4: 1 Montgomery St.**

Allentown Birmingham Boston Cleveland Dallas Denver Detroit Franklin, Va. Los Angeles Nazareth, Pa. New Orleans No. Kansas City, Mo. Ocala, Fla. Oswego, N. Y. Seattle Toledo

IN CANADA: St. Regis Paper Co. (Can.) Ltd., Montreal, Vancouver.

Without obligation, please send me full details regarding "Case History" No. 9, outlined above.

NAME_____

COMPANY_____

ADDRESS_____

Fertilizer Companies Report Profits

International Minerals & Chemical Corporation

In making public its 37th annual report, International Minerals & Chemical Corporation reported net profits of $2,925,657 after all charges for the fiscal year ended June 30, 1946, as compared with $2,038,169 for the previous fiscal year.

Earnings per common share for the year were $3.92 for the 646,346 shares outstanding, whereas earnings for the previous year were $2.76 per share on 594,466 shares then outstanding.

In a letter to stockholders accompanying the report, Louis Ware, president of the company, pointed out that net sales for the year were $34,373,106, representing an increase of $4,072,016 or 13 per cent over the previous fiscal year. Similarly, the net increase of $7,024,439 over the fiscal year ended June 30, 1944, represented an increase of 26 per cent.

"All divisions of the corporation showed sales and earnings improvements over the previous year," Mr. Ware said, "and the over-all progress in its additions to plants and facilities is beginning to show results as reflected in a dollar volume of sales and earnings exceeding all previous records."

Virginia-Carolina Chemical Corporation

The annual report of the Virginia-Carolina Chemical Corporation for the year ended June 30, 1946, showed net sales of $36,604,025, compared with $33,425,307 during the previous year. Net earnings, after provision for Federal income taxes, totaled $1,702,598, an increase of 70 per cent over 1944–45 earnings of $955,576. Total assets increased from $33,385,844 on June 30, 1945, to $34,542,132 on June 30, 1946.

In his report to the stockholders, President A. Lynn Ivey stated, "Throughout the extended emergency period machinery and equipment have been subjected to abnormally heavy wear and tear, and great difficulties and delays have been encountered in procuring replacements. They are now being brought back to a higher degree of repair and efficiency. Also, there are contemplated many plant additions and expansions, requiring large expenditures. Some of these are now under way. The new fertilizer plane at Dubuque, Iowa, is scheduled to start prot-

See page 29

Your Sacking Scales Are the Mill's Cash Registers...

Model 2224

Fertilizer is cash! Every ingredient you use in processing represents a cash outlay. Finished chemical products are the result of these cash bought ingredients plus processing machinery, labor and general overhead expenses. Since packaging is the last operation isn't it good business to know how much goes into the bag, how efficiently it is accomplished and how much it costs to do that packaging. Actually your scales are the mill's cash registers for they tell what goes into the bag and accurately. This assures a profit, everything else being equal. Efficiency and cost are dependent upon fewer breakdowns and low maintenance expenses. These time-thrifty and low cost features are found in EXACT WEIGHT Sacking Scales which today are delivering the lowest per unit cost in years as well as meeting production schedules unfailingly. Put an end to your packaging worries by writing for EXACT WEIGHT Sacking Scale details today.

INDUSTRIAL PRECISION

Exact Weight Scales

SALES and SERVICE in all Principal Cities from Coast to Coast and Canada

THE EXACT WEIGHT SCALE COMPANY

901 W. Fifth Avenue • Columbus 8, Ohio
Dept. Oe *783 Yonge St.* *Toronto, Canada*

duction during the current fiscal year. The fertilizer plant at Nichols, Florida, a remodeled and enlarged unit of the properties acquired from the Phosphate Mining Company, is nearing completion and is scheduled to be in production within sixty days. The phosphate mining and processing facilities in Florida are being more than doubled. These additions are scheduled to be in production within a few months. Plans are in readiness for further diversification of our products."

At the annual meeting of stockholders on September 27th, all members of the Board of Directors were re-elected. The newly elected Board made no changes in the officers of the corporation for the coming year.

Farm Chemical Needs Told by Lockwood

Agriculture in the United States will require approximately 14,000,000 tons of chemicals for the year ending June 30, 1947, Maurice H. Lockwood, president of the National Fertilizer Association, declared before the Chemical Market Research Association, at a meeting in the Biltmore Hotel, New York, September 17th.

Barring interruptions of supply, Mr. Lockwood said that this will be 91 per cent more ton volume and 103 per cent more of the three major plant nutrients than was used on an average during the five years 1935 through 1939.

Dollars spent nationally each year for fertilizers closely reflect the farm income during the preceding year. Mr. Lockwood said neither ton volume nor the quantity of plant nutrients follows the dollar sign, however. He added that the 1921 and 1937 records show that in each of these years the dollars spent by agriculture in the United States for fertilizers was approximately $253,000,000, yet in 1937 those dollars secured for their use more than twice the quantity of plant food as in 1921.

This shift, Mr. Lockwood said, was due to the change from higher to lower cost materials. He added, that one change was in nitrogen sources, away from natural organics to lower unit priced inorganic chemicals. Another, he said, was the increase in plant food content of fertilizer.

Plant Food Council Forms Traffic Committee

Appointment of a Traffic Committee for the American Plant Food Council has been announced by President Clifton A. Woodrum. The committee is composed of Joseph A. Daly, Chilean Nitrate Sales Corporation; James W. Harnach, Cooperative G. L. F. Soil Building Service, Inc.; Zachary Taylor, Potash Company of America; D. A. Dashiell, F. S. Royster Guano Company; G. H. Alfriend, Virginia-Carolina Chemical Corporation, and George W. Leyhe, Armour Fertilizer Works.

Phosphate Adds to Tennessee Hay Profits

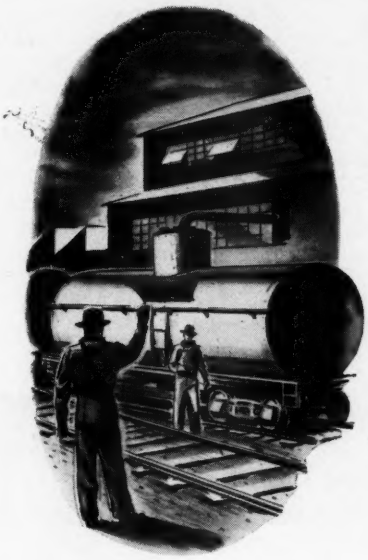
Extra profit of $25 per acre on an eight-acre field of lespedeza has convinced Bruce Blevins, TVA-Extension Service area demonstration farmer of Monroe County, Tennessee, that hereafter he should use "all of the triple superphosphate he can get."

Blevins received through his regular community organization triple superphosphate to be used on the field of lespedeza. The field had been previously limed at the rate of two tons per acre. Assistant County Agent J. O.

New SPENSOL

SPENCER NITROGEN SOLUTIONS

OFFERS ALL THESE *EXTRA + BENEFITS* IN MIXING *HIGHER NITROGEN* FERTILIZERS



+ MORE NITROGEN PER DOLLAR

The high nitrogen content of New *Spensol* nitrogen solutions makes *Spensol* your new, economical source for efficient, more profitable mixing. (See chart below.)

+ HIGHER NITROGEN CONTENT

The high nitrogen content of SPENSOL makes possible the manufacture of high nitrogen complete fertilizers, now so much in demand ... without detriment to other fertilizer ingredients in the mix.

+ EASIER MIXING

Spensol is easy to mix and facilitates the preparation of a clean, non-caking fertilizer that cures more quickly.

+ IMMEDIATE AVAILABILITY

Spensol is ready for shipment to you in tank car lots direct from Spencer Chemical Company's Jayhawk Works, centrally-located at Pittsburg, Kansas. Our technical advisory staff is at your service, without charge.

Assure Your *SPENSOL* 1946-47 Supply—Phone Your Order Today!

COMPOSITION OF SPENSOL (SPENCER NITROGEN SOLUTIONS)

	Ammonium Nitrate %	Anhydrous Ammonia %	Water %	Total Nitrogen %	Nitrate Nitrogen %	Ammonia Nitrogen %
SPENSOL A	65.0	21.7	13.3	40.6	11.36	29.24
SPENSOL B	55.5	26.0	18.5	40.8	9.62	31.18
SPENSOL C	66.8	16.6	16.6	37.0	11.65	25.35

Spencer Chemical COMPANY

FERTILIZER

General and Sales Offices: Dwight Building, Kansas City 6, Missouri
Works: Pittsburg, Kansas
• Manufacturers of HI-NITROGEN Fertilizer Products.

Hendrix asked Blevins to leave an unfertilized check plot.

It was evident from the start that the triple phosphate was going to increase the yield of lespedeza hay; and the difference between the fertilized field and the check plot became greater as the hay matured.

By the time the hay was ready for harvesting, the difference was so marked that Blevins decided to make a definite test of the value of the application. He selected in the middle of each area a plot of 625 square feet. He harvested the hay from each plot with a hand scythe, and stacked it in two shocks. After allowing these shocks to dry for 2 hours he weighed them. The shock from the fertilized plot weighed 173 pounds, while the shock from the unfertilized plot weighed only 47 pounds.

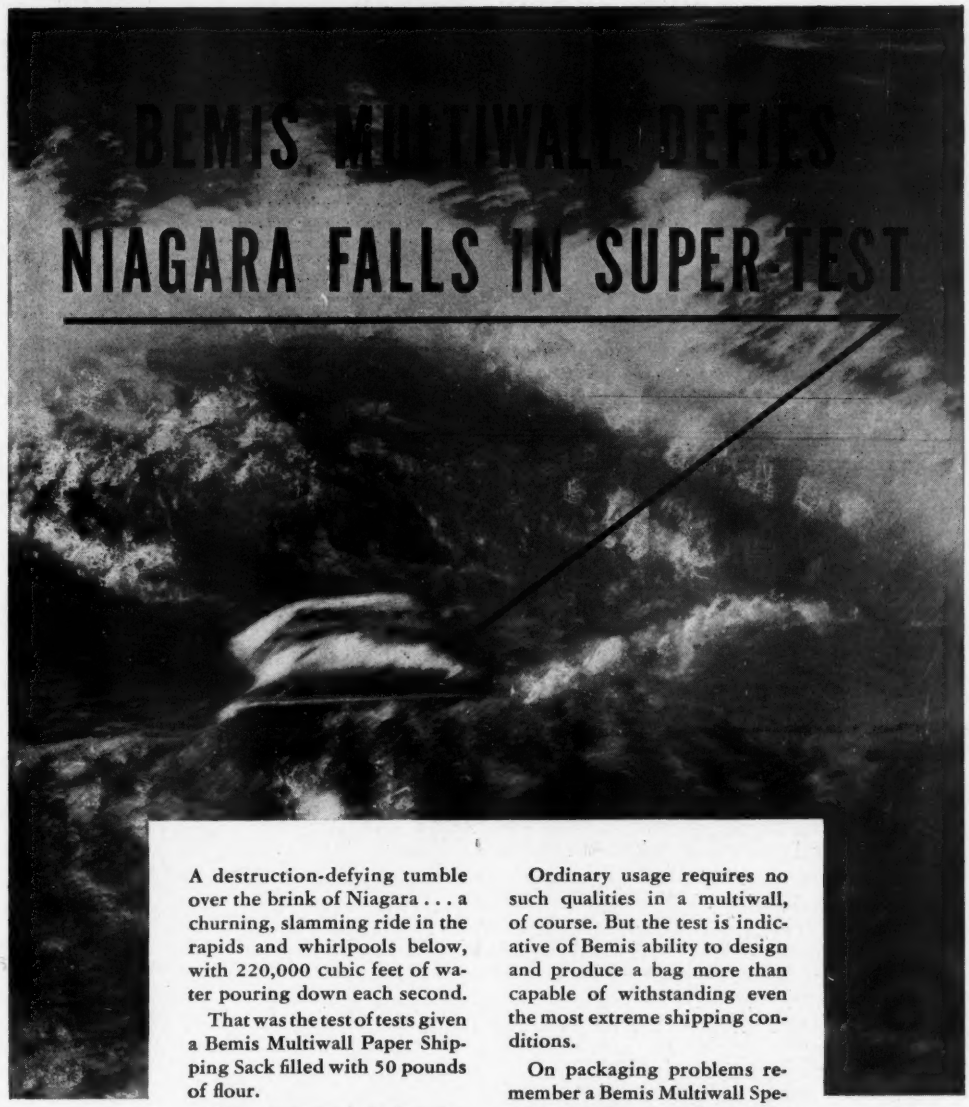
Lion Oil Company Building Nitric Acid Plant

Lion Oil Company has begun construction at its Chemical Division plant near El Dorado, Arkansas, of three new forty-five-ton-per-day capacity ammonia oxidation units for the production of nitric acid, T. H. Barton, president, has announced. This new construction will increase present nitric acid capacity by approximately 50 per cent. Ground for foundations has already been broken at the plant and erection will proceed at once.

The new units include complete facilities for nitric acid production and certain additional facilities, which will be installed, will permit the company to make nitrogen solutions, adding a new product to the Company's Chemical Division sales.

At capacity operation the new facilities will be capable of diverting some 4,000 tons per month of present anhydrous ammonia production into more than 9,000 tons of solutions with a nitrogen content of approximately forty per cent. The project is expected to be completed and in operation during the first quarter of 1947.

This expansion offers more flexibility to the operations of the Chemical Division and will give greater diversification of products. At the same time, entry into the nitrogen solution market can be effected without reducing production of grained ammonium nitrate fertilizer, for which demand greatly exceeds supply, Colonel Barton said.



A destruction-defying tumble over the brink of Niagara . . . a churning, slamming ride in the rapids and whirlpools below, with 220,000 cubic feet of water pouring down each second.

That was the test of tests given a Bemis Multiwall Paper Shipping Sack filled with 50 pounds of flour.

When recovered, the bag was suitable for immediate shipment as a commercial container.

Ordinary usage requires no such qualities in a multiwall, of course. But the test is indicative of Bemis ability to design and produce a bag more than capable of withstanding even the most extreme shipping conditions.

On packaging problems remember a Bemis Multiwall Specialist is always ready to help you. Call any of the 33 Bemis Plants and Offices.

BEMIS BRO. BAG CO.

Peoria, Ill. • East Pepperell, Mass. • Mobile, Ala. • San Francisco, Calif. • Wilmington, Calif. • St. Helens, Ore.

Baltimore • Boise • Boston • Brooklyn
Buffalo • Charlotte • Chicago • Denver
Detroit • Houston • Indianapolis
Kansas City • Los Angeles • Louisville

BEMIS BRO. BAG COMPANY

Memphis • Minneapolis • New Orleans
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Omaha • Orlando • St. Louis • Salina
Salt Lake City • Seattle • Wichita

FERTILIZERS IN WARTIME GERMANY

(Continued from page 11)

There were 33 superphosphate plants in pre-war Germany with an estimated total capacity of 306,030 metric tons of P_2O_5 annually. On the basis of the data given in Table VIII it appears, therefore, that during the three years immediately preceding the war, production of superphosphate in Germany was at the rate of only 39 to 52 per cent of the productive capacity. Of the pre-war plants, one has been partially destroyed and seven more or less completely destroyed, so that the present capacity is estimated to be 186,030 tons. Eighteen of the plants had co-existing facilities for manufacture of sulphuric acid with a pre-war total capacity in excess of 300,000 tons of SO_3 annually. Two of these acid plants are known to have been destroyed.

Basic slag was produced by 17 plants, of which nine were in the Ruhr and four in the Saar. As production of basic slag is inseparably geared to steel manufacture, the cut back in steel production in Germany means that only about one-third of the slag formerly produced will be available in the future.

Potash in Germany

The production of potash from the 24 refineries in Germany (Old Reich) remained at a high level during the period 1939 to 1944, and, in general, it showed only small fluctuations from year to year (Table XI). It was not until the latter year that the production fell below the output in 1937. Also, the export of potash (Table XI) was well maintained, despite the cessation of extra-European shipments after 1939.

Like the production of potash, its consumption as fertilizer in Germany (Old Reich) was maintained at a high level during most of the war years (Table XII). Compared to 1938–39 the consumption was 106 per cent in 1940–41, 103 per cent in 1942–43, and 57 per cent in 1944–45. In 1938–39, the last year for which complete data are available, the quantities of the different forms of potash used as fertilizer were as follows: kainit (12–20 per cent K_2O), 159,131; KC1 (40 per cent K_2O), 840,040; KC1 (50 per cent K_2O and higher), 249,688; K_2SO_4 (48–52 per cent K_2O), 9,727; and sulphate of potash-magnesia (26–30 per cent K_2O), 51,257 metric tons of K_2O. In 1938–39 the average consumption of potash was 44 kilograms of K_2O per hectare of arable land. It ranged from 13 kilograms in Hohenzollern to 88 kilograms in Oldenburg.

The "normal" productive capacity for potash in Germany is estimated at 1,830,360

TABLE XI

GERMANY'S PRODUCTION AND EXPORT OF POTASH SALTS, CALENDAR YEARS 1936 TO 1944
(Metric tons of K_2O)

Year	Production	Export
1936	1,436,765	336,081
1937	1,687,960	438,785
1938	1,869,366	383,471
1939	1,750,517	382,738
1940	1,745,941	365,628
1941	1,824,377	287,561
1942	1,744,700	308,800
1943	1,746,915	340,722
1944	1,604,487	284,010

TABLE XII

CONSUMPTION OF POTASH AS FERTILIZER IN GERMANY, 1936–37 TO 1944–45
(Metric tons of K_2O)

Year[1]	Consumption	Year[1]	Consumption
1936–37	955,563	1941–42	1,254,559
1937–38	1,186,781	1942–43	1,348,983
1938–39	1,309,843	1943–44	1,074,823
1939–40	1,145,614	1944–45	750,000[2]
1940–41	1,392,064		

[1]May 16th to May 15th.
[2]Estimated.

CLASSIFIED ADVERTISEMENTS

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metric tons of K_2O annually. According to Nadler,[10] there are some 220 locations of potash mines in Germany.

[10]Marcus Nadler, "International Position of the Potash Industry," in, Jules Backman, "The Economics of the Potash Industry," American Potash Institute, 55 pp. (1946).

(*To be concluded in next issue*)

MAGNESIUM IN AGRICULTURE

(Continued from page 8)

creased input of oxide and basic carbonate of magnesium caused large increases in magnesium outgo, whereas equivalent inputs of magnesite and dolomite showed virtually no increases. Annual leachings of 75 pounds of magnesia from dolomite additions were common to the 8–, 32–, and 100-ton CaO equivalent inputs, as against corresponding MgO leachings of 260 pounds from magnesite. Leachings from unsorbed dolomite reflected its double carbonate composition and registered behavior distinct from that induced by a mixture of the precipitated carbonates in like proportion.

The ratio of Mg to Ca in the net outgo from soil containing unsorbed dolomite was virtually the same as the ratio that characterizes H_2O–CO_2 extractions of raw dolomite, but when dolomite input was sorbed the subsequent leachates show enrichment for Mg, without such for Ca. Decrease in particle size of dolomite caused substantial increases in magnesium outgo. Outgo of Mg from all forms was diminished substantially during passage of leachates through subsoil. After sorption, dolomite, its calcine, and simulative oxide mixtures impart magnesium enrichment to rainwater leachates, but without concomitant enrichment of calcium. The MgO–CaO calcine and the corresponding mixture of the two oxides behaved identically in the soil, outgo from upperhalf conventional incorporations being 15 times that from those in lower half. In all cases the major fraction of Mg outgo is attributable to bicarbonates, and all forms of magnesium induced enhancement in the outgo of sulphates and nitrates. Over a 28-year period, annual net releases of magnesia from sorbed dolomite and from sorbed 2000– and 3750-pound CaCO3-equivalences of MgO were only 14, 29, and 54 pounds, respectively, in terms of $CaCO_3$ equivalence. The Mg + Ca outgo from dolomite was almost invariably greater than such joint outgo from equivalent incorporations of limestone.

Heavy incorporations of basic carbonates of magnesium induced distinct initial toxicity that was cured by aging and by additive silicic acid, whereas dolomite and magnesium silicate produced no toxicity.

Magnesium in Citrus Fertilization in Florida

A. F. Camp, Citrus Experiment Station, Lake Alfred, Fla.

This paper covers the history of the use of magnesium for citrus and particularly the use of magnesium as a major fertilizer constituent for Florida citrus. The relationship between the chemical composition of the various soils and the occurrence of the deficiency is discussed, including both sandy and calcareous soils. The magnesium requirements of citrus are reviewed and particularly the relationship between magnesium deficiency and seed development. The development of the symptoms is shown to be due primarily to the translocation of magnesium from the leaves to the fruit rather than being a primary deficiency which handicaps new growth as is the case in some of the other deficiencies which involve elements which do not translocate readily. The interrelationship between potassium, calcium, and magnesium is important and where the first two are high and the third low the intake of magnesium is reduced, and contrariwise when magnesium is provided at high levels the other two must be increased also. The relative effectiveness of certain magnesium carriers is discussed in relation to the fertilizer and pH control programs.

The effect of magnesium deficiency on the size of the crop size of the individual fruit, vitamin, and sugar content of the fruit and the resistance of the tree and fruit to cold is discussed. The over-all effects of the correction of magnesium deficiency in Florida citrus is reviewed. (Continued on page 30)

See Page 30

Magnesium-Phosphorus Relationships in Plant Nutrition

Emil Truog, R. J. Goates, and K. C. Berger, University of Wisconsin, College of Agriculture, Madison, Wis.

One of the functions ascribed to magnesium in plant nutrition is that of being a carrier of the phosphorus used by the plant. If this is the case, one might expect to find a correlation between the phosphorus and magnesium contents of plants. The investigations reported in the literature dealing with the analysis of plant tissue show in some cases a positive and in others a negative correlation in this respect. It would seem that a better criterion of this possible relationship would be results obtained from the analysis of the seed portion of plants rather than the tissue in general. Accordingly, analyses were made of canning peas and canning corn grown on good prairie silt loam with (usually the equivalent of 30 pounds of MgO per acre) and without the addition of magnesium sulphate. Fertilizer containing nitrogen, phosphorus, and potassium was applied at equal rates in both cases. The results with peas grown in 1945 and 1946, and corn in 1945 show a 10 to 15 per cent increase in content of both magnesium and phosphorus. Thus, support is given to the theory that magnesium is associated with the use of phosphorus by plants.

Effect of Magnesium on Growth and Composition of Tobacco

J. E. McMurtrey, Jr., Bureau of Plant Industry, U. S. Department of Agriculture, Beltsville, Md.

The importance of magnesium as a field fertilizer was first recognized for tobacco. The distinctive chlorosis of tobacco due to magnesium deficiency was first called sand drown before the cause for the condition was known. It is striking in appearance and is characterized by a loss of green color of the lower leaves of the plant, beginning at the leaf tip and progressing inward along the margins and between the veins. The deficiency may be evident on plants at any stage of growth from the small seedling to maturity. It is usually more evident on light soils following periods of excessive rainfall.

Soils of different series varying in magnesium content from 0.024 to 0.24 have been found to manifest the deficiency. Where 12 pounds of water-soluble magnesium have been used on such soils, the deficiency was corrected, whereas in the form of finely pulverized magnesia limestone it requires five to ten times this amount. When leaf tobacco contained 0.15 per cent magnesium, deficiency symptoms were usually evident, while leaves showing 0.25 per cent were generally free of symptoms of magnesium deficiency. High ash content is associated with magnesium deficiency. The green leaf shows a higher organic acid and moisture content than normal. The starch reserves of the green are low when magnesium deficiency is severe

Top Dress Pasture Land in the Fall

"Now is the time to top dress hay and pasture land," says Ralph B. Littlefield, Extension agronomist at the University of New Hampshire. He suggests getting the job done before October 15th. For good stands of grass hay from which the clovers have disappeared Littlefield recommends 500 to 700 pounds of 7–7–7 per acre. For mixed stands of grass and clover he suggests applying 5–10–10 at the same rate. But when a stand is made up largely of clover an 0–14–14 fertilizer should be used.

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